

# Extending a UML and OCL Tool for Multi-Levels: Applications towards Model Quality Assessment

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**Abstract**—Currently, meta- and multi-level modelling is gaining more and more attention. A natural, upcoming question is, how to extend existing two-level approaches to cover multi-levels. In this contribution, we extend the UML and OCL tool USE in order to describe multi-level models. We also apply the extension to demonstrate the usefulness of multi-level modelling for model querying and model quality assessment.

## I. INTRODUCTION

In this contribution we show how to upgrade a two-level modeling tool to three levels of modeling by adding the OMG (Object Management Group) UML meta-model to the topmost level. In addition to this tool extension, we discuss reflective model querying as it plays an essential role. Therefore, we also present a reflective model querying approach using OCL for the meta-model. We apply meta-model queries for model quality evaluation. Developers can use an appropriate method to evaluate their model and find drawbacks and problems on it.

## II. META-MODELING IN TOOL USE

In the current contribution, we introduce an approach, in which the MOF architecture is integrated into USE for multi-level modelling. Roughly speaking, we now make the third OMG layer M2 explicitly available, and an instance of the M2-model corresponding to the user model is added to the M1-layer. Fig. 1 shows the general schema for the three-level modeling in the new version of USE.

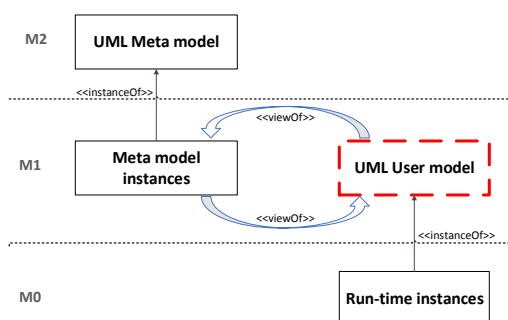


Fig. 1. General schema for the three-level modeling.

## III. APPLICATION: MODEL QUALITY ASSESSMENT

Model quality assessment helps modelers to detect errors or mistakes on their models. These assessment properties might include design properties, respecting naming conventions or metrics properties [2]. We introduce a proposal that employs OCL utilizing the three-level modeling approach as presented before. Thus, we can automatically evaluate quality properties of a user model. Fig. 2 shows the workflow of our proposal for model quality evaluation, which uses reflective OCL constraints as a major ingredient.

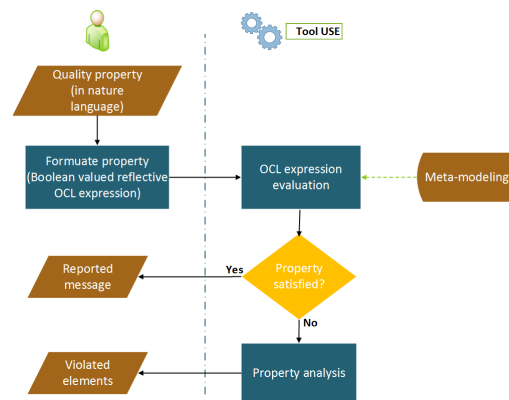


Fig. 2. Workflow of model quality assessment process.

## IV. CONCLUSION

This contribution has proposed an extension of the tool USE that supports three-level modelling where the middle level can be seen at the same time as an object diagram, i.e., the instantiation of the meta model, and as a class diagram, i.e., the type model for the lower level. Based on these ideas, we present approaches for model quality assessment.

## REFERENCES

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